

CLAIMS :

1. Method of transmitting data symbols using multi-carrier Code Division Multiple Access (MC-CDMA) for accessing a transmission system, the method comprising:
 - spreading the data symbols with a set of predefined spreading sequences of successive chips for producing sequences of spread data symbols including the data symbols multiplied by the chips,
 - mapping the spread data symbol sequences so that they are assigned to selected sub-carriers among a set of predefined sub-carriers and to selected time slots in a predefined periodic time interval,
 - modulating the mapped spread data symbol sequences using Orthogonal Frequency Division Multiplexing (OFDM) for producing OFDM modulated symbols to be transmitted on the selected sub-carriers and in the selected time slots,wherein two successive spread data symbols are assigned to non-successive sub-carriers and in non-successive time slots.
2. Method as claimed in claim 1, wherein the step of mapping includes defining a mapping matrix of size $K_t L \times K_f L$, L being the length of the predefined spreading sequences, K_t and K_f denoting time and frequency interleaving depths respectively, $K_t L$ representing the number of time slots in the periodic time interval and $K_f L$ representing the number of sub-carriers in the set of predefined sub-carriers, an OFDM modulated symbol being transmitted in a time slot and transporting $K_f L$ spread data symbols, wherein the mapping matrix comprises $L \times L$ sub-matrices, denoted M_i^n , $i = 1..L$, of size $K_t K_f$, where $n = 1..L$ corresponds to the n^{th} chip of the spreading sequence, which sub-matrices comprise $K_t K_f$ sub-matrix elements corresponding to spread data symbols, for simultaneously transmitting $K_t K_f L^2$ spread data symbols on the corresponding selected sub-carriers and in the corresponding selected time slots and wherein the positions of the sub-matrix elements are predetermined with respect to quality criteria depending on the transmission system.
3. Method as claimed in claim 2, wherein the sub-matrices are distributed in the mapping matrix in order that the sub-matrices M_i^n corresponding to a same n^{th} chip are assigned to same set of K_f successive sub-carriers.

4. Method as claimed in claim 2, wherein the sub-matrices are distributed in the mapping matrix in order that the sub-matrices M_i^n corresponding to a same n^{th} chip are assigned to a same set of K_i successive time slots.

5. Transmitter for transmitting data symbols using multi-carrier Code Division

5 Multiple Access (CDMA) for accessing a transmission system, comprising:

- spreading means for spreading the data symbols with a set of predefined spreading sequences of successive chips for producing sequences of spread data symbols including the data symbols multiplied by the chips,

10 - mapping means for mapping the spread data symbol sequences so that they are assigned to selected sub-carriers among a set of predefined sub-carriers and to selected time slots in a predefined periodic time interval,

- modulating means for modulating the mapped spread data symbol sequences using Orthogonal Frequency Division Multiplexing (OFDM) for producing OFDM modulated symbols to be transmitted on the selected sub-carriers and in the selected time slots,

15 wherein two successive spread data symbols are assigned to non-successive sub-carriers and in non-successive time slots.

6. Method of receiving multi-carrier data encoded by a transmitter and sent via a transmission system using multi-carrier Code Division Multiple Access (CDMA) for accessing the transmission system, the encoded data being OFDM modulated after being

20 spread with a set of predefined spreading sequences, the method comprising:

- demodulating the received multi-carrier data with respect to a set of predefined sub-carriers,
- de-mapping the demodulated data for retrieving the set of predefined spreading sequences and

25 - de-spreading the set of predefined spreading sequences for retrieving the encoded data sent by the transmitter.

7. Receiver for receiving data encoded by a transmitter and sent via a transmission system using multi-carrier Code Division Multiple Access (CDMA) for accessing the transmission system, the data being OFDM modulated after being spread with a set of predefined spreading sequences, the receiver comprising:

30 - a demodulator for demodulating the received multi-carrier data with respect to a set of predefined sub-carriers,

- de-mapping means for de-mapping the demodulated data for retrieving the set of predefined

spreading sequences and

- de-spreading means for de-spreading the set of predefined spreading sequences for retrieving the encoded data sent by the transmitter.

Computer program product for a transmitter computing a set of instructions, which when loaded into the transmitter, causes the transmitter to carry out the method as claimed in claim 1.

8. Computer program product for a receiver computing a set of instructions, which when loaded into the receiver, causes the receiver to carry out the method as claimed in claim 6.

9. Transmission system comprising at least a transmitter and a receiver for transmitting data from the transmitter to the receiver using multi-carrier Code Division Multiple Access (CDMA) for accessing the transmission system, the transmitted data being modulated using Orthogonal Frequency Division Multiplexing (OFDM) after being spread with a set of predefined spreading sequences of consecutive chips, wherein two successive chips of the predefined sequences are transmitted on non-successive carriers and in non-successive time intervals.